HW 7.5 Key

1. Dodi goes long a 6-month futures contract on 100 units of stock index XYZ. She makes an initial deposit of $22,000 in her margin account, which is credited with interest of 9% effective per annum. The contract is marked-to-market and settled at the end of each week. The initial value of the XYZ index is 1000. The following table shows the index futures price for the first 3 weeks:

Week	Futures Price, End of Week
0	1000
1	997
2	1003
3	1007

X is the amount in Dodi's account at the end of 3 weeks. Determine X. [18 #06]

[A] $22,810 B) $22,125 C) $22,353 D) $22,582 E) $23,038

	Beg. Bal	ΔP (per unit)	ΔP (Total)	End Balance
n=0	–	–	–	22,000
n=1	22,036	−3	−300	21,736
n=2	21,772	+6	+600	22,372
n=3	22,410	+4	+400	22,810

2. Suppose the S&P 500 index is currently 1800.

You wish to enter into 10 long S&P 500 futures contracts.

The multiplier for the contracts is 250 and the initial margin is 16%.

You earn a continuously compounded annual rate of 6.5% on your margin balance, and your position is marked-to-market weekly.

The maintenance margin is 66% of the initial margin.

If, at the end of any given week, your margin balance is lower than the maintenance margin, you will receive a margin call requiring you to deposit additional margin equal to the deficit.

What is the highest S&P index futures price one week from today that will result in your receiving a margin call?

[A] 1702 B) 1600 C) 1634 D) 1668 E) 1736

Initial Margin: $10(250)(1800)(0.16) = 720{,}000$

Maintenance Margin: $720{,}000(0.66) = 475{,}200$

End of Week Balance: $720{,}900\, e^{0.065/52} + 2500\,\Delta P$

Margin Call If: $720{,}900.56 + 2500\,\Delta P < 475{,}200$

$\Delta P < -98.02$

$S_t < \boxed{1701.72}$

3. Lena enters into 35 short forward contracts on stock index XYZ. Each contract is for the delivery of 140 units of the index. The initial margin is set at 10%. The margin account earn interest at an annual effective rate of 8%, and is marked-to-market weekly. The current value of the stock index is 600. The following table shows the index prices for the first 3 weeks:

Week	Futures Price, End of Week
0	600
1	580
2	564
3	583

Find the balance of Lena's margin account at the end of 3 weeks.

[A] $379,015 B) $211,602 C) $375,225 D) $209,486 E) $213,718

4900 units

	Beg Balance	ΔP (per unit)	ΔP (total)	End Balance
n=0	-	-	-	294,000
n=1	294,435	-20	-98,000	392,435
n=2	393,017	-16	-78,400	471,417
n=3	472,115	+19	+93,100	379,015

4. Evelyn has entered into 20 short forward contracts on a certain stock index. Each contract is for 100 shares of the index. The initial margin is 14%, and the maintenance margin is 70% of the initial margin. Evelyn's margin account earns interest at a continuously compounded rate of 8%. The account is marked-to-market monthly.

At the time when Evelyn enters the contracts, the price of the stock is S. At the end of the first month the price of the stock is 202, and Evelyn receives a margin call in the amount of 5,598.28. Find S.

[A] 191 B) 179.54 C) 183.36 D) 187.18 E) 194.82

Initial Margin: $20(100)(S)(0.14) = 280S$

Maintenance Margin: $(280S)(0.7) = 196S$

New Balance: $280S e^{0.08/12} + (S-202)(2000)$

Margin Call: Maint. Margin − New Bal = 5598.28

$$S[196 - 280e^{0.08/12} - 2000] + 404{,}000 = 5598.28$$

$S = \boxed{191}$

5. Jordan has entered into 15 long forward contracts on a certain stock index. Each contract is for 70 shares of the index. The initial margin is 14%, and the maintenance margin is 75% of the initial margin. Jordan's margin account earns interest at a continuously compounded rate of 7%. The account is marked-to-market monthly.

   At the time when Jordan enters the contracts, the price of the stock is S. At the end of the first month the price of the stock is 106, and Jordan receives a margin call in the amount of 4,112.46. Find S.

   A) 114 B) 109.44 C) 111.72 D) 116.28 E) 118.56

Initial Margin: $15(70)(S)(0.14) = 147S$

Maint. Margin: $(147S)(0.75) = 110.25S$

New Balance: $147Se^{0.07/12} + (106 - S)(1050)$

Margin Call: Maint. Margin − New Bal = 4112.46

$$S[110.25 - 147e^{0.07/12} + 1050] - 111{,}300 = 4112.46$$

$$\boxed{S = 114}$$